Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Scaling model for nonlinear supersonic jet noise WOUTIJN BAARS, CHARLES TINNEY, The University of Texas at Austin — Numerous endeavors have been undertaken to investigate nonlinear propagation of sound from jet flows in range-restricted environments. However, only weak observations of cumulative nonlinear effects have been made using these laboratory-scale setups, all the while being observed under full-scale conditions. The inconsistency is caused by the lack of rigor in understanding what the appropriate scaling parameters should be for producing measurable cumulative nonlinearities in laboratory-scale environments. A scaling model will be presented that one could use to guide future studies aimed at investigating this unique component of turbulent mixing noise. At first, the important length-scales for cumulative nonlinear waveform distortion – the shock formation distance and the acoustic absorption length – are written in terms of jet exit parameters. Their ratio, expressed as the effective Gol'dberg number, is a measure of the strength of nonlinear distortion relative to that of dissipation. By computing the individual length-scales and this dimensionless ratio for an experiment that is being designed, one can estimate the presence of cumulative nonlinear distortion beforehand.

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Date submitted: 12 Aug 2012 Electronic form version 1.4